



Open Systems Architecture in DoD Acquisition: Opportunities and Challenges

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DASD, Systems Engineering Mission



Systems Engineering focuses on engineering excellence – the creative application of scientific principles:

- To design, develop, construct and operate complex systems
- To forecast their behavior under specific operating conditions
- To deliver their intended function while addressing economic efficiency, environmental stewardship and safety of life and property

DASD(SE) Mission: Develop and grow the Systems Engineering capability of the Department of Defense - through engineering policy, continuous engagement with component Systems Engineering organizations and through substantive technical engagement throughout the acquisition life cycle with major and selected acquisition programs.

US Department of Defense is the World's Largest Engineering Organization

Over 99,000 Uniformed and Civilian Engineers

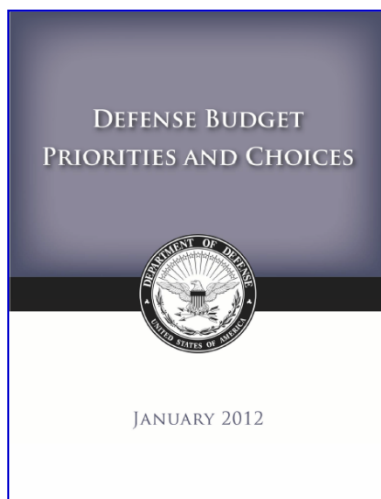
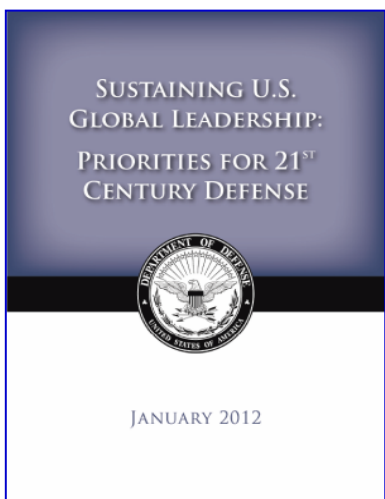
Over 39,000 in the Engineering (ENG) Acquisition Workforce



Key Elements of Defense Strategic Guidance



- The military will be smaller and leaner, but it will be agile, flexible, ready and technologically advanced.
- Rebalance our global posture and presence to emphasize Asia-Pacific regions.
- Build innovative partnerships and strengthen key alliances and partnerships elsewhere in the world.
- Ensure that we can quickly confront and defeat aggression from any adversary - anytime, anywhere.
- Protect and prioritize key investments in technology and new capabilities, as well as our capacity to grow, adapt and mobilize as needed.





2013 DoD Leadership Focus: Challenges, Choices, Opportunities



Chuck Hagel

24th Secretary of Defense

Sworn in February 27, 2013

- The challenges posed by a changing strategic landscape and new budget constraints;
- The choices we have in responding to these challenges, and;
- The opportunities that exist to fundamentally reshape the defense enterprise to better reflect 21st century realities.



Challenges to the DoD Engineering Enterprise



- Lay solid foundations...create opportunities
- Envision multiple futures...enable flexible choices
- Design and build systems with focus on lifecycle cost
- Protect our critical defense “intellectual property”
- Focus on “**3 Ps**” of the DoD Engineering Enterprise: **P**olicy, **P**ractice and, most importantly, **P**eople



Resilient Design

- **The only constant for DoD systems is change:**
 - Evolving threats
 - Strategic and Tactical Innovation
 - Rapid technological change
 - Increased Defense leverage of commercial systems
 - Resource and demand uncertainty
- **These factors all demand increased resilience - the ability to explicitly design military systems to have capacity to adapt and adjust to maintain relevance and operational advantage in an**

Open System Architecture is a key contributor to Resilient Design



Defining Open Systems Architecture



What: *A technical architecture that leverages technical standards to support a modular, loosely coupled and highly cohesive system structure*

How: *Customer definition and ownership of product architecture; publication of key interfaces within the system*

Why: *Enables Open, Competitive Business Model – allowing components to be added, modified, replaced, removed or supported by different vendors throughout the life cycle – driving opportunities to enhance competition and innovation*



DoD Interest in Open Systems Architecture



- **Drives risk-prudent competition**
- **Enables Business Architectures that mirror Technical Architectures**
- **Provides a constant battle rhythm of competition**
- **Levels playing field; reduces barriers to market entry**
- **Addresses obsolescence risk**
- **Promises wider access to innovation**



Open Systems: Enabling New Business Models



Objective: Competition at the sub-system level

- **Government must be able to share:**
 - Design documentation, specifications, interfaces, tools, etc
 - Architecture definition
 - Established sub-systems boundaries that are defined, coherent and loosely coupled
- **Focus on what is needed for competition:**
 - Scale sufficient to attract competitors
 - Scoped to accept innovative offerings
 - Support for innovation through appropriate licensing of IP
- **Government must be a smarter buyer.**
 - Creates significant new demands on government in-house



Open Systems Considerations in Development

Establish an Environment for

- Be clear about intent to compete/recompete
- Establish a flexible contracting approach
- Incentivize good behavior among contributing contractors

Focus Systems Engineering for

- Develop common architectures across a product line or across related
- Functionally decompose legacy capabilities



Leverage and Exercise Data

- Assess current and needed data rights
- Be a better customer: confirm that data rights restrictions are correct and assert data rights
- Use government purpose rights (GPR) for next competition

Explore Business Architectures and Sound Competition Approaches

- Inject OSA through technical insertions
- Consider alternative integrations concepts
- Insure incentives align with desired behaviors
- Reward reuse



Balancing Potentially Conflicting Goals



Customer

- **Cost of Data Rights**
- **Typical Engineering Deliverables**

Vendor

- **Competitive Advantage**
- **Financial Return on Research Investment**

**Use of Open Systems
must be driven by a
value-focused business
case.**



Technical Data, Computer Software, and Intellectual Property Rights



- **Data rights are considered up-front when developing an acquisition strategy; if critical data and software are not be specified for delivery, they may be unavailable (or unaffordable) years later for use on a program during its sustainment phase.**
- **Some Technical Data Rights Strategy considerations:**
 - Data deliverables included in the RFPs and subsequent contracts
 - Data rights, including the responses to the contractor's data assertion lists
 - Data management approach including how the data will be delivered, accessed, maintained, and protected



Diminishing Manufacturing Sources and Material Shortages (DMSMS): An Emerging Crisis



- **Likely impact of current fiscal environment:**
 - Fewer new-start development programs
 - More Service Life Extension Programs (SLEP)
- **Accelerating technology life cycles means fewer sources for “pin-compatible” replacement parts**
- **Driving SLEP cost and risk:**
 - Loss of OEM sources
 - Obsolete parts
 - Loss of component pedigree
 - Loss of key manufacturing expertise

Open Systems Principles Mitigate Much of DMSMS Risk



Some OSA Challenges

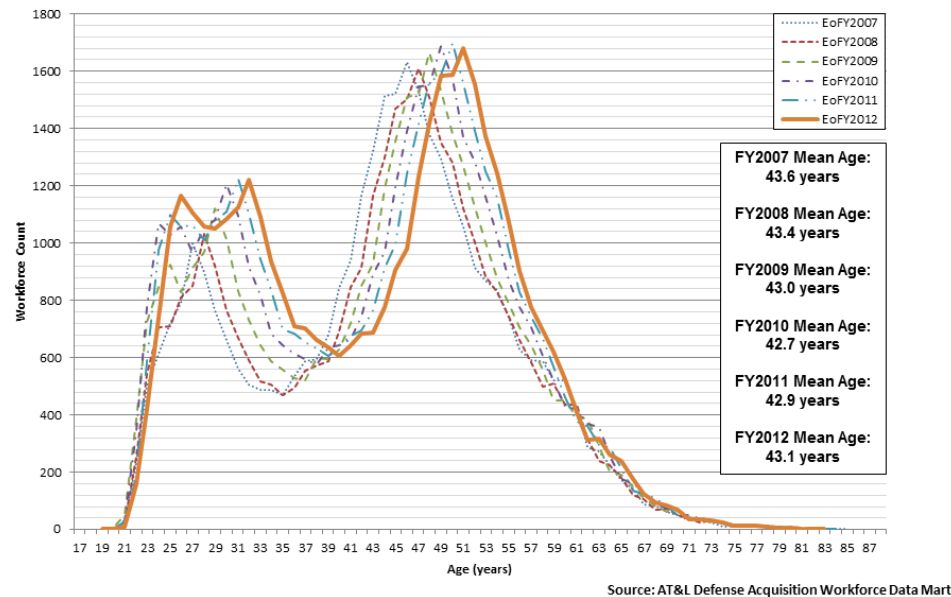
- **Lack of key technical insight by government customers**
- **Risk of Government acting as integrator**
- **Inability to project long-term DoD plans = uncertain business cases**
- **Risk of architectural lock in**



Defense Acquisition Workforce Readiness for OSA



DoD Acquisition Engineering Workforce Demographics



Current fiscal uncertainty and government workforce pressures may impede adoption of OSA

- Adequate capacity and capability in Defense engineering workforce
- Policy and practice supporting engineering design environment
- Department must be an informed user and have active participant in standards development
- Stable long term plan to support capturing ROI in OSA investments
- Successful OSA implementation creates technical demands on customer



Opportunities and Challenges



- **DoD is looking to innovative acquisition models to achieve increased efficiency and effectiveness**
- **Open Systems Architectures offer great opportunities to leverage sub-system- level competition to future-proof systems, provide a pathway for innovation and drive down cost over time**
- **Open Systems business models are dependent on detailed engineering designs that incorporate and define open systems architectures, standards and interfaces**
- **These designs will increase demand on DoD engineering competence, capability and capacity**
- **Adoption of open systems approaches should only be made where a well defined business case and acquisition strategy support this approach**



Systems Engineering: Critical to Defense Acquisition



Innovation, Speed, Agility
<http://www.acq.osd.mil/se>